Work Order ID July-11-12 9:44:40 Al			*871	58*	•.		=	and the same	Page 1
Revision ID:	-664-203TRN Tube Turning Detail Start Qty: 1.00	*1*	Accept	*N900 Cust Item I		ገ ቦ * ፡	Setup Sta	. 14	S1* S2*
Required Date: 8/10/1 Reference:	Req'd Qty: 1.00	*1*		Customer:	149		D 74-		·
Approvals: Proc QC:	ess Plan:	Date: /207	//Tooling: SPC (Y/N):	3	ate: ate:	_	Run Sta Sto		R1* R2*
Sequence ID/ Work Center ID	Operation Description		Set Up/ Run Hours	Tool ID	Tool # Pla		Reject Qty	Reject Number	Insp. Stamp
Draw Nbr D412-664-243	Revision Nbr Rev E(DEO)								,
100 *100* Mori Seiki	MORI SEIKI CNC LA	THE LARGE	0.00	:			þ	/*	/ K -12-7
Mori Seiki CNC Lathe Larg	te 1-Fill tube 2-Turn fir		OT8534 on both ends as pe	er Folio FA166					

110

QC1-Inspect dimensions to dimension sheet

0.00

110

QC Quality Control

Memo

0.00

1 \$ /kc-12-7-21

	•									4
W/O:			WO	RK ORDER CHANG	GES					
DATE	STEP	PRO	OCEDURE CHAI	NGE		Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC inspector
										_
40	1.									
		·								
Part No	:	PAR #:	Fault Cate	gory:	NCI	R: Yes I	No DQ	A:	Date:	
	Re	esolution:	Disposition	n: <u>`</u>	QA:	N/C Clo	sed:		Date: _	·
NCR:		,		ER NON-CONFORM	IANCE	(NCR)				
DATE	STEP	Description of NC	Initial	Corrective Action Sec Action Description	ction B	Sign &		cation	Approval	Approval
		Section A	Chief Eng	Chief Eng		Date	Secti	ion C	Chief Eng	QC Inspector

Work Ord July-11-12 9:44		158		*871	58*						Page 2
Item ID: Revision ID: Item Name:	D412-664-20 Crosstube Tur		·	Accept	*N900	040	100)* s	etup Star	ı vı .	S1* S2*
Start Date: Required Date: Reference:	7/11/12	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*		Cust Item 1 Customer:				9		
Approvals:	Process Pla	ın:	Date:	Tooling:	D	ate:		R	tun Star Stop	171	R1*
	QC:	,	Date:	SPC (Y/N):	D	ate:			Stop	*N	R2*
Sequence ID/ Work Center I	D	Operation Description		Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120 Mori Seiki		MORI SEIKI CNC LAT	HE LARGE	0.00					\$	KC	
Mori Seiki CNC La	the Large	2- File trans 3- Remove									
130		QC1- Inspect dimension	s to dimension sheet	0.00							
130 QC Quality Control		Memo + PERFOR	M ULTRA SONIC MEA	0.00 SUREMENT				-1-	<i>\$</i>		2 12-7
										$\overline{}$	b /
140 *140*		QC8- Inspect parts - sec	ond check	0.00			0	3		\setminus	
QC Quality Control		Memo + CHECK I BENDING	ULTRA SONIC MEASU	0.00 REMENT AND ORIENTA	TION FOR					2-7	24

	page								
W/O:			WO	RK ORDER CHANG	ES				
DATE	STEP	PRO	CEDURE CHAN	IGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
*								111	
			4.						
Part No):	PAR #:	Fault Categ	ory:	NCR: Yes	No DQ	A:	Date:	
	R	esolution:	Disposition	: `	_ QA: N/C C	losed:		Date: _	
NCR:		V	WORK ORDE	R NON-CONFORMA	NCE (NCI	R)			
DATE		Description of NC		Corrective Action Section		Verific	cation	Approval	Approval
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign Date	& Secti	ion C	Chief Eng	QC inspector
		¥							
		·							
		\$0		C.					
		•							

Work Order ID 87158 July-11-12 9:44:40 AM		in the same	.:	Page 3				
Item ID: Revision ID:	D412-664-	203TRN		Accept	*N90004	.0100*	Setup Star	ו בימו
Item Name:	Crosstube To	urning Detail					Stop	' *NS2*
Start Date:	7/11/12	Start Qty: 1.00	*1*		Cust Item ID:			
Required Date:	: 8/10/12	Req'd Qty: 1.00	*1*		Customer:			
Reference:		3.	•				***	
Approvals:	Process P	lan:	Date:	Tooling:	Date:		Run Star	"NRT"
	QC:		Date:	SPC (Y/N):	Date:		Stop	° *NR2*
Sequence ID/ Work Center I	D	Operation Description		Set Up/ Run Hours	Tool ID Too	ol# Plan Acco	ept Reject Qty	Reject Insp. Number Stamp
145			`	0.00				
145 Crosstubes		N	ing.	0.00		17	775	
Crosstubes		Memo GRIND ON	LY TRANSITION LINE	ES SMOOTH LONGITUD	E WAY. MO	12-	*-	
150				0.00				
150								
HandFXtube		Memo		0.00	** ACEPTAN			
Hand Finishing Cro	osstubes	1- PRESSUI	RE WASH X-TUBE IN	SIDE AND OUT		mob	IZ	-7-25
	- L	2- ACID ET	CH X-TUBE INSIDE A	AND OUT. USE RED SCC	OTCH BRITE	Km		+
160		QC5- Inspect part compl	eteness to sten on W/O	0.00				
160	9	QUO mopost part compr	cioness to step on w/o	0.00		(DAS)		
QC QC		Memo		0.00				17-7-25
Quality Control								12 / 20

-4	oopaoo	Liu							\$.
W/O:		F-101	WC	ORK ORDER CHANGE	ES				•
DATE	STEP	PROC	CEDURE CHA	NGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
				+					
Part No	·	PAR #:	_ Fault Cate	gory:	NCR: Yes	No DQ	A:	Date:	
	R	esolution:	Dispositio	n: <u>'</u>	QA: N/C C	losed:		Date: _	
NCR:		W	ORK ORD	ER NON-CONFORMA	NCE (NC	R)			
		Description of NC		Corrective Action Section		Verifi	cation	Approval	Approval
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign Date	& Sect	ion C	Chief Eng	QC Inspector
		**							
									:

Work Order ID	87158
July-11-12 9:44:40 AM	

July-11-12 9:44		130		*8/1	58*			Page 4
Item ID: Revision ID:	D412-664-20	O3TRN		Accept	*N900040	100*	Setup Sta	ו כימו
Item Name:	Crosstube Tur	ning Detail		× .			Sto	[»] *NS2*
Start Date:	7/11/12	Start Qty: 1.00	*1*		Cust Item ID:			
Required Date:	8/10/12	Req'd Qty: 1.00	*1*		Customer:			
Reference:							.41	
Approvals:	Process Pla	ın:	Date:	Tooling:	Date:		Run Sta	"NR1"
	QC:		Date:	SPC (Y/N):	Date:		Sto	*NR2*
Sequence ID/ Work Center I	D	Operation Description		Set Up/ Run Hours	Tool ID Tool #	Plan Acce Code Qty	pt Reject Qty	Reject Insp. Number Stamp
*170 *170* Packaging		Packaging Memo		0.00	MO	12-	9-25	<u> </u>
Packaging			stock in kanban rack	vivv				
180		QC21- Final Inspection	- Work Order Release	0.00				
1 80		Memo		0.00			MLJ	12/07/25
Quality Control								

MF 25

									•
W/O:			WC	ORK ORDER CHANGI	ES				
DATE	STEP	PRO	OCEDURE CHA	NGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
									+
Part No	:	PAR #:	Fault Cate	gory:	NCR: Yes	No DQ	A:	Date: _	
	Re	esolution:	Disposition	n: <u>`</u>	QA: N/C CI	osed:		Date: _	
NCR:			WORK ORD	ER NON-CONFORMA	NCE (NCF	R)			
DATE	STEP	Description of NC Section A	Initial Chief Eng	Corrective Action Section Action Description Chief Eng	on B Sign & Date	Verific Secti	cation on C	Approval Chief Eng	Approval QC Inspector
			Office Ling	Office Ling	Date				
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									:

July-11-12 9:44:40 AM

Work Order ID:

87158

Parent Item:

D412-664-203TRN

Parent Item Name:

Crosstube Turning Detail

Start Date: 7/11/12

Required Date: 8/10/12

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev:A 08-03-06 new issue DD verified by:eec

IPP Rev B 08.04.02 Removed polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6009-129		Manufactured	No			120	Each	19.0000	1	1			
Crosstube Material											<u>-</u>		

Location

LG

Loc Oty

Loc Code

19 19

- mant 12/07/19

Dait Aci	ospace	LIG								<i>'</i> ,
W/O:			V	ORK ORDE	R CHANGE	S				
DATE	STEP	PRO	OCEDURE CH	IANGE		Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
					Š.	9				
		Δ.							191	
Part No	•	PAR #:	Fault Ca	tegory:		NCR: Yes	No DQ	A:	Date: _	
	Re	esolution:	Disposit	ion:		QA: NC C	losed:		Date:	
NCR:		,	WORK OR	DER NON-C	ONFORMA	NCE (NCI	₹)		1111-1111111111111111111111111111111111	
DATE	STEP	Description of NC		Corrective A			Verifi	cation	Approval	Approval
DALL	J.L.	Section A	Initial Chief Eng	Action	Description hief Eng	Sign Date		ion C	Chief Eng	QC Inspector
e,									_	
:										
				-						

DART AEROSPACE LTD	Work Order:	87158
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: E		Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	spection Sheet awing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
	2.684	+0.005/-0.000	2.688	//		VERW	CNC
1	2.748	+0.005/-0.000	2.753	//		1	1
	2.884	+0.005/-0.000	2.888	//			
	3.019	+0.005/-0.000	3.024	//			
	3.163	+0.005/-0.000	3.168				
	3.308	+0.005/-0.000	3.3/3	/			
⋖	3.429	+0.005/-0.000	3.432	1			
SIDE	2.990	+0.005/-0.000	2.994	//			
S	2.618	+0.005/-0.000	2.623				
							4
· ,{{\dagger}	0.200	+/-0.010	:200			4	4
18,	R0.063	+/-0.010	.063	/_		RG	°R6
	R0.500	+/-0.010	.500	//		R6	RL
į	4.971	+/-0.030	4.978	/		VERN	CNC-08
	2.684	+0.005/-0.000	2.689				
ŀ	2.748	+0.005/-0.000	2.753				
	2.884	+0.005/-0.000	2.889				
	3.019	+0.005/-0.000	3.029	/			
	3.163	+0.005/-0.000	3.168	/_			
	3.308	+0.005/-0.000	3-313	//			· l
Ω	3.429	+0.005/-0.000	3,430		'		
SIDE	2.990	+0.005/-0.000	2.993				
୬	2.618	+0.005/-0.000	2.622.				
	0.000		2.40	/		1	
	0.200	+/-0.010	500	/	-	0/	0.
	R0.063	+/-0.010	-063	/		R6	RG
	R0.500	+/-0.010	.560	1		RL	KU
	4.971	+/-0.030	4,975			VERN	CNC-08
L	124.100	+/-0.020	124.100		1	tape	18600

										-		DQA:	Date:	
NCR:	Yes	/ No					WORK ORDER NON-O	COI	VFOR	/ANCE / UP	DATE			
												QA Closed:	Date:	
Nork Ord	er:						DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part No. NCR No.							Rework Scrap Use-as-is Work Order Update		Machining Small Fa Thermoforming Finishin		Crosstube Small Fab Finishing	Water Jet Prod. Eng. Coor. Rec/Store/Packaging		Engineering Quality Other
NCA	IVO.						work Order Opdate	J		Large Fab	Composite	J	. Supplier] [
Root					Des	cri	otion of work order update	П	nitial	Ac	tion	Sign &		
Cause		Date	Step	Qty			or Non-conformance	Ch	ief Eng	Desc	ription	Date	Verification	QC Inspector
oc/Data														
quip/Tooling														
perator				1 1				1						
laterial														[
etup														
ther														
rocess														
upplier												İ		
raining				1										
napproved	\Box													
				<u> </u>	· · · · · · · · · · · · · · · · · · ·		F	AUL	T CATE	GORY			•	
Land	ing (Gear					General							
		Bending					Bend	Г	Grain			Ovalized		Pressure/Forced
		Centre No	ot Conce	ntric to (o/s		BOM/Route	Γ	Hardwa	re		Over/Under	tolerance	Temperature/Cure
	Г	Cracks				Г	Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct 🤏 🗸	Weld
	Г	Crushed/0	Crimped.			Г	Burrs	Г	Instruct	ions Incomplete/	'Unclear	Part Lost/M	issing	Wrong Stock Pulled
		Cuffs				Γ	Contamination		Mainte	nance		Part Moved		
		Heat Trea	it				Countersink		Mislabe	led		Positioned V	Wrong '	
		Inspection	n Strip in	Tube			Cut Too Short		Misread	I		Power Loss/	Surge	Other.
		Ripples in	Bend				Drill Holes		Offset					
	Г	Torque W		Extrusion	า	Г	Drawing		Out of	Calibration			-	· · · · · · · · · · · · · · · · · · ·
		Turning S	eauence			Г	Finish		Out of Sequence					

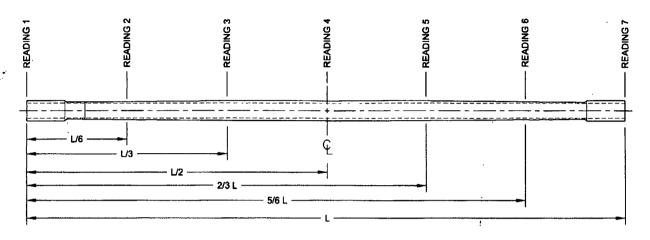
Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Wave/Twist in Tube

DART AEROSPACE LTD	Work Order:	87158
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: E		Page 2 of 2

WALL THICKNESS MEASUREMENT



	WALL	THICKNESS I	MEASUREMEN	IT (IN)	Deviation	TOLEDANCE	
Location	w1	w2	w3	w4	Δw (max-min)	TOLERANCE	
READING 1 L= 0"	,401	.390	.351	.358	.050	·	
READING 2 L=	.33)	.313	.295	.308	,036		
READING 3 L=	.492	.474	.474	. 492.	.018		
READING 4 L=	650	.643	.631	.639	,019	0.073"	
READING 5 L=	489	.491	,472	.477.	.019		
READING 6 L=	.315	.320	306	,305	,015		
READING 7 L=	.396	.381	. 360	.370	.026		

Calibration Result

Actual Block Thickness: 100-500

Sitescan 250 Measured Thickness: 100-500

Measured by:	Audited by:		Preliminary Approval:	
Date: 12-7-22	Date:	2-7-24	Date:	

Rev	Date	Change	Revised by	Approved
Α	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
В	06.03.09	Dwg Rev updated	KJ/JLM	
С	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	
D	10.02.02	Dimension 124.100 was 124.09	KJ / A	11
E	12.06.04	Wall thickness form added	KJ OX	
				

			DQA:	Date:
NCR:	Yes / No	WORK ORDER NON-CONFORMANCE / UPDATE	· · · · ·	

										QA Closed:	Date:	
Work Orde	er:				DISPOSITION		-		AGAINST DE	PARTMENT	/PROCESS	
Part No					Rework Scrap Use-as-is Work Order Update		Machining Small Fab Thermoforming Finishing		Crosstube Small Fab Finishing Composite	Water Jet Prod. Eng. Coor. Rec/Store/Packaging Supplier		Engineering Quality Other
Root	_	_			ption of work order update	1	itial		tion	Sign &		
Cause	Date	Step	Qty	(or Non-conformance	Chie	ef Eng	Desci	ription	Date	Verification	QC Inspector
Doc/Data												
Equip/Tooling												
Operator												
Material								•				
Setup				:		1						
Other	\square											
Process												
Supplier		1								.,		
Training	\vdash											
Unapproved		<u> </u>									<u> </u>	<u> </u>
. 1.		<u>.</u>				AULI	CATE	JORY				
Landi	ng Gear				General	<u></u> ,	C:		_	70		70
	Bending			_ <u> </u>	Bend BOAA/Boarba		Grain		<u> </u>	Ovalized	<u> </u>	Pressure/Forced
		ot Conce	ntric to (^{5/5} -	BOM/Route	\vdash	Hardwa		-	Over/Under Part Incorre	-	Temperature/Cure Weld
	Cracks	Crimped.		-	Broken/Damaged Burrs			ion Incomplete ions Incomplete/	/Unclose	Part Lost/M	-	Wrong Stock Pulled
	Cuffs	Crimpeu			Contamination	\rightarrow		nance	- Unicieal	Part Moved		I WI OII STOCK Fulled
	Heat Tre	at		-	Countersink	\vdash	Mislabe		-	Positioned \		
		at on Strip in	Tuhe		Cut Too Short	\vdash	Misread		<u> </u>	Power Loss		Other
	Ripples in	•		 	Drill Holes	\vdash	Offset	•	<u> </u>	الــــــــــــــــــــــــــــــــــــ		123
		Vaves in E	xtrusio	, <u> </u>	Drawing	-		Calibration				
	_			· -	Finish	\mathbf{H}	Out of Sequence					
	Turning Sequence Wave/Twist in Tube				Folio	-	Outside Dimensions					

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Item	Qty -243	Part Number	Description
1	х	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
6	2	D2856-600-1009	ABRASION STRIP
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTROWBELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
- FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING) 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
- PAINT OUTSIDE PER DART QSI 005 4.2 TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 47.0 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

4.1158 00/120112

С

DECICAL	QU DARTAFROOD	AOF	ITD
REV.	DESCRIPTION	BY	DATE
Α	NEW ISSUE	PH	01.10.17
В	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	РН	05.02.04
С	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30	мв	06.10.27
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
Ε	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN 86-3, C4-3, C8-3 & CS-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.09.30

DESIGN	PH	DART AEROSPACE LTD					
DRAWN	RF	HAWKESBURY, ONTARIO	, CANADA				
CHECKED	9	DRAWING NO.	REV. E				
MFG. APPR.	177	D412-664-243	SHEET 1 OF 4				
APPROVED	140	TITLE	SCALE				
DE APPR.	-44	CROSSTUBE ASSEMBLY (41	12 HI AFT) NTS				
DATE 09 0	9.30	COPYRIGHT © 2001 BY DART AEF	IN THE EXPRESS CONDITION THAT IT IS				

											DQA:	Date:	
NCR:	Yes	/ No				WORK ORDER	R NON-CO	NFOR	MANCE / UP	DATE			
											QA Closed:	Date:	
Work Orde	or.					DISPOSIT	ION	AGAINST DEPARTMENT/PROCESS					
Work Orac	٠١٠.					R	ework		Skid-tube Crosstube			Water Jet	Engineering
Part i	Vo.								Small Fab	Pro	d. Eng. Coor.	Quality	
							Use-as-is Thermoforming Finishing			~ -	Rec/Sto	re/Packaging	Other
NCR I	۷o.					Work Order U	Jpdate		Large Fab	Composite		Supplier	
Root					Desc	ription of work order	undate	Initial	Ac	ction	Sign &		
Cause		Date	Step	Qty	2000	or Non-conformance		Chief Eng		cription	Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling													
Operator	Ш												
Material	Ш												
Setup	Ш						ŀ						
Other	Ш		Į.										
Process	Ш												
Supplier													
Training]				
Unapproved			<u> </u>										
							FA	JLT CATE	GORY				
Landi	ng G	Gear			_	General	_				_		_
ŀ		Bending				Bend		Grain			Ovalized		Pressure/Forced
		Centre No	ot Conce	ntric to	o/s	BOM/Route		Hardwa	are		Over/Under	tolerance	Temperature/Cure
						Broken/Damaged	——————————————————————————————————————			Γ	Part Incorre	ct	Weld

Instructions Incomplete/Unclear

Maintenance

Out of Calibration

Out of Sequence

Outside Dimensions

Mislabeled

Misread

Offset

Part Lost/Missing

Positioned Wrong

Power Loss/Surge

Part Moved

Wrong Stock Pulled

Other

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Crushed/Crimped.

Inspection Strip in Tube

Torque Waves in Extrusion

Cuffs

Heat Treat

Burrs

Contamination

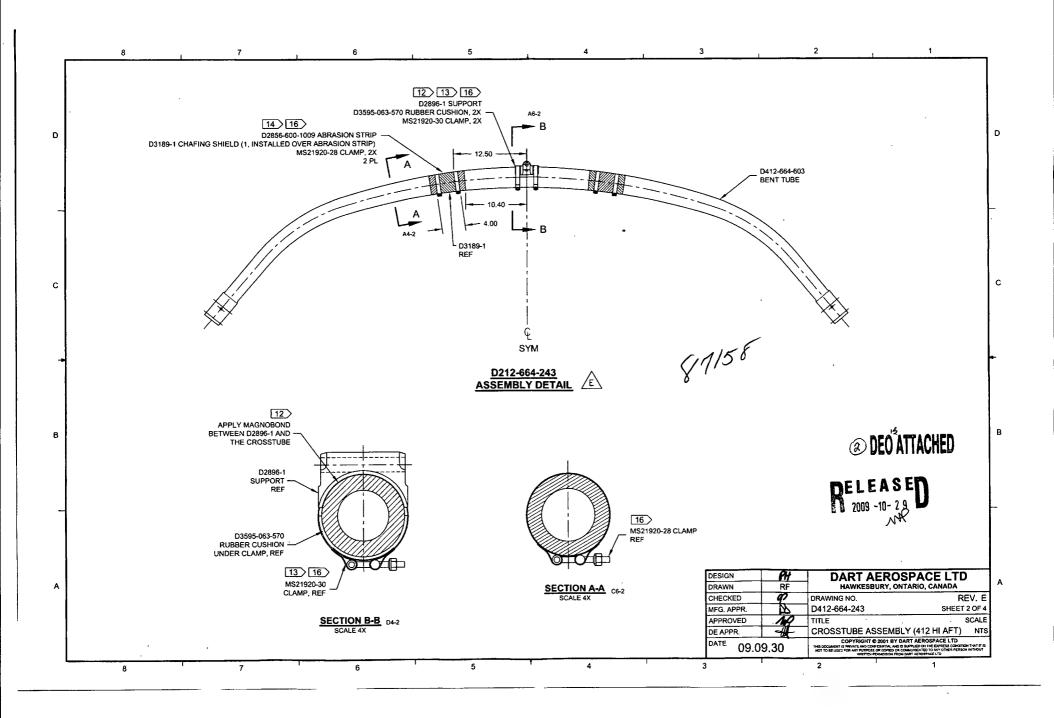
Countersink

Cut Too Short

Drill Holes

Drawing

Finish



											DQA:	Date:		
NCR:	⁄es	/ No				WORK ORDER NON-C	100	NFORM	MANCE / UPDATE					
											QA Closed:	Date:		
Work Orde	or.					DISPOSITION			AGAI	NST DE	PARTMENT/PROCESS			
i voik ora						Rework		Skid-tube Crosst	tube		Water Jet	Engineering		
Part I	No.					Scrap Machining Small Fab			Fab	Pro	d. Eng. Coor.	Quality		
				-:		Use-as-is		Thern	noforming Finis	hing	Rec/Sto	re/Packaging	Other	
NCR No.				Work Order Update]		Large Fab Compo	osite		Supplier				
Document of the control of the contr					Deseri	ntian of work and an undata		nitial	Action		Cian 0			
Root		Date	Ston	Qty		ption of work order update or Non-conformance	l	nicial iief Eng	Description		Sign & Date	Verification	QC Inspector	
Cause		Date	Step	Qty		or Non-comormance	Ci	ner eng	Description		Date	verification	QC Inspector	
Doc/Data Equip/Tooling	_													
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Process	┢													
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Training	_]	1	:									
Unapproved														
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Landi	ng (Gear				General		_			_		_	
		Bending				Bend		Grain			Ovalized	L	Pressure/Forced	
	L.	Centre No	ot Conce	ntric to	o/s	BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure	
		Cracks				Broken/Damaged	L	Inspect	on Incomplete		Part Incorre	ct	Weld	
		Crushed/	Crimped.			Burrs		Instruct	ions Incomplete/Unclear		Part Lost/M	issing	Wrong Stock Pulled	
İ		Cuffs				Contamination		Mainte	nance		Part Moved			
		Heat Trea	it			Countersink] Mislabe	led		Positioned \	Vrong	_	
		Inspection Strip in Tube				Cut Too Short		Misread	i		Power Loss/	Surge	Other	

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

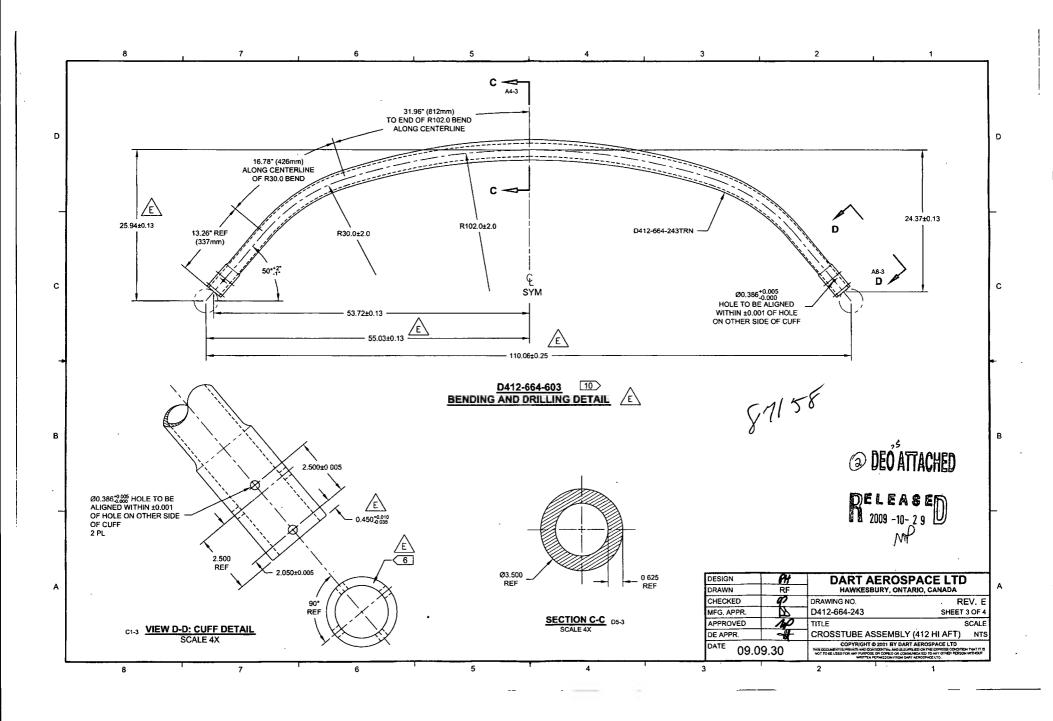
Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G



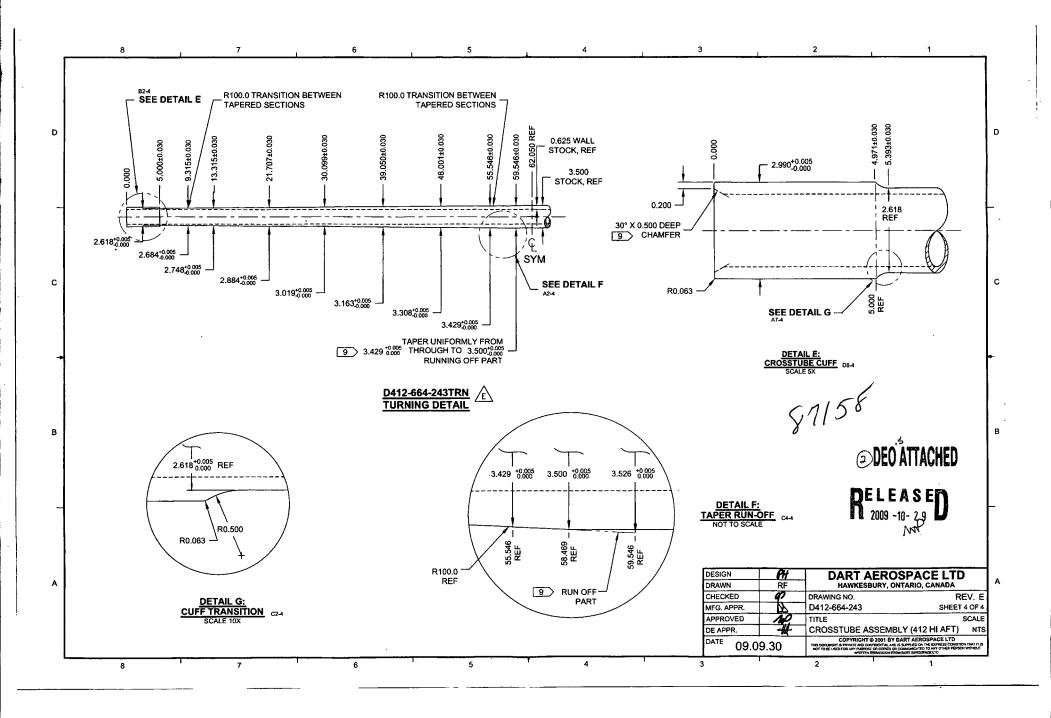
NCR:	Yes	/	No

												DQA:	Date:	
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		i					DISPOSITION				AGAINST DE			
Vork Ord	er:						DISPUSITION				AGAINST DEI	PARTIVICIVI)		
Part I							Rework Scrap Use-as-is Work Order Update		Skid-tube Crosstube Machining Small Fab Thermoforming Finishing Large Fab Composite			Proc Rec/Stor	Engineering Quality Other	
Root Des							otion of work order update		nitial	Actio	on	Sign &	· · ·	
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oc/Data quip/Tooling perator laterial etup ther rocess upplier raining														
· · · · · · · · · · · · · · · · · · ·							F	AUL	T CATE	GORY				
Land	ng (1				_	General		,			7		۱
		Bending Centre Not Concentric to O/S Cracks				Bend BOM/Route Broken/Damaged		1	on incomplete		Ovalized Over/Under Part Incorred	ct	Pressure/Forced Temperature/Cure Weld	
	<u> </u>	Crushed/0	Crimped.	-		<u> </u>	Burrs	<u></u>	4	ions Incomplete/Ur	nclear	Part Lost/Mi	ssing	Wrong Stock Pulled
	<u> </u>	Cuffs					Contamination	_	Mainte			Part Moved		
	Heat Treat				\vdash	Countersink	\vdash	Mislabe		<u> </u>	Positioned V		٦	
	\vdash	Inspection		Tube		<u> </u>	Cut Too Short		Misread	I		Power Loss/	Surge	Other
	<u> </u>	Ripples in				<u> </u>	Drill Holes	<u></u>	Offset					
	<u> </u>	Torque W			n	┕	Drawing	\vdash	-	Calibration				
	1	Turning S	equence			1	Finish	1	Out of	equence				

Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Wave/Twist in Tube



										DQA:	Date	e: _	
NCR: Y	es / No)			WORK ORDER NON-	COI	NFORM	MANCE / UPDATE		QA Closed:	Date	۵٠	•
					DISPOSITION			AGAINS	T DE	PARTMENT			
Work Orde	r:								_	1	_	_	
					Rework Skid-tube Crosstub					Water Jet	_	Engineering	
Part N	lo				Scrap	4	1	Machining Small Fa	-	4	d. Eng. Coor.	_	Quality
					Use-as-is	4	Thermoforming Finishing			Rec/Sto	re/Packaging	4	Other
NCR N	lo				Work Order Update	_		Large Fab Composi	te[Supplier		
Root			T	Descri	ption of work order update		Initial	Action		Sign &		T	
Cause	Date	Step	Qty	(or Non-conformance	Cł	nief Eng	Description		Date	Verification		QC Inspector
Doc/Data													
Equip/Tooling													
Operator			1										
Material													
Setup	_												
Other													
Process												Ì	
Supplier													
Training	_					1							
Unapproved				<u></u>						<u> </u>	<u> </u>		
						AU	LT CATE	GORY	.,				<u> </u>
Landir	ng Gear			<u></u>	General	<u></u>	la .		_	٦	Г	一,	, /r
	Bendir	•			Bend	-	Grain		-	Ovalized	}		Pressure/Forced
		Not Conce	entric to	0/5	BOM/Route	-	Hardwa		-	Over/Under	<u>+</u>		Temperature/Cure
	Cracks			-	Broken/Damaged	-	- 4	on Incomplete	-	Part Incorre	⊢		Weld
	_	d/Crimped	l.	-	Burrs	\vdash	Instruct	ions Incomplete/Unclear	-	Part Lost/M		'لـــ	Wrong Stock Pulled
1 3	Cuffs			1	(Contamination		IIVIAINTE	nance		Part Moved			

Mislabeled

Out of Calibration

Out of Sequence

Outside Dimensions

Misread

Offset

Countersink

Cut Too Short

Drill Holes

Drawing

Finish

Folio

Positioned Wrong

Power Loss/Surge

Other

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Heat Treat

Inspection Strip in Tube

Torque Waves in Extrusion

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DRAWING NO.	TITLE		REV. E	DART AEROSPACE LTD	D.E.O. NO),	SHEET NO.	SCALE
D412-664-243	CROSSTUB	E ASSEME	3LY (412 HI AFT)	ENGINEERING ORDER	D412-6	64-243-E-1	SHEET 1 OF 2	NTS
DRAWN	4	CHECKED	M	MFG. APPR.	APPROVED	WP	DE APPR.	
DATE 11.0	3.31	DATE	11/03.31	DATE #1.03.31	DATE	11/03.31	DATE 11-03.31	

PURPOSE:

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

CHANGE:

PARTS LIST IS AMENDED AS FOLLOWS:

<u> 15:</u>

Item	Qty -243	Part Number	Description
6	0	D2856-600-1009	ABRASION STRIP

WAS:

6	2	D2856-600-1009	ABRASION STRIP

NOTES 2 AND 14, SHEET 1 ARE AMENDED AS FOLLOWS:

IS:

2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2

MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)

PAINT OUTSIDE PER DART QSI 005 4.2

AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA

14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

WAS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2 PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.

81158



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												DQA:	Dat	e:	
NCR:	Yes	/ No				WORK ORDER NON-C	100	NFORM	JANCE / UP	DATE			_		
									-			QA Closed:	Dat	e:	
Work Ord	or.					DISPOSITION				AGAINST D	E	PARTMENT	PROCESS		
Part I	Part No. NCR No. Root Descri					Rework Scrap Use-as-is Work Order Update	Skid-tube Crosstube Machining Small Fab Thermoforming Finishing Large Fab Composite				Water Jet Prod. Eng. Coor. Rec/Store/Packaging Supplier			Engineering Quality Other	
Root					Descri	ption of work order update		Initial	Ac	ction		Sign &			
Cause		Date	Step	Qty	(or Non-conformance	Ch	nief Eng	Desc	cription		Date	Verification	1	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved															
							AUL	LT CATE	GORY						
Landi		Bending Centre Not Concentric to O/S				General Bend BOM/Route		Grain Hardwa	re			Ovalized Over/Under	tolerance		Pressure/Forced Temperature/Cure
	\vdash	Cracks			<u> </u>	Broken/Damaged		⊣	on Incomplete	<u> </u>		Part Incorre			Weld
		Crushed/	Crimped.		<u> </u>	Burrs	<u></u>	-1	ions Incomplete/	/Unclear		Part Lost/Mi	ssing	Ĺ	Wrong Stock Pulled
	-	Cuffs			_	Contamination	\vdash	Mainte		-		Part Moved			
	-	Heat Trea			<u> </u>	Countersink	_	Mislabe				Positioned V			7
	-	Inspectio	-	Tube		Cut Too Short	_	Misread	i	L		Power Loss/	Surge	<u> </u>	Other
1	Ripples in Bend				1	Drill Holes		Offset							

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

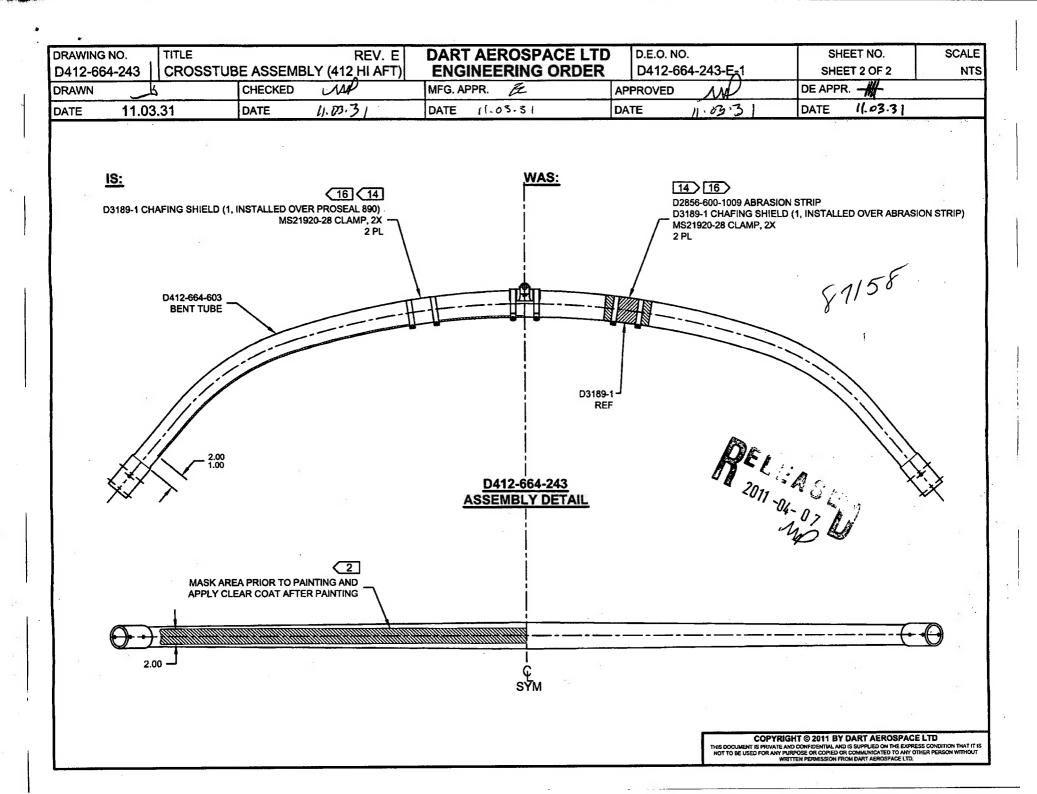
Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G



												DQA:	Date	e:	
NCR:	Yes	/ No				WORK ORDER NON-	COI	VFORM	MANCE / UP	DATE				-	
											Q	A Closed:	Dat	e:	
Work Ord	er:					DISPOSITION AGAINST (AGAINST DE	P/	RTMENT/	PROCESS			
Part No						Rework Scrap Use-as-is Work Order Update	Skid-tube Crosstube Machining Small Fab Thermoforming Finishing Large Fab Composite			Small Fab Finishing	Water Jet Prod. Eng. Coor. Rec/Store/Packaging Supplier				Engineering Quality Other
Root					Descri	ption of work order update	!	Initial	Ac	tion		Sign &	V		
Cause		Date	Step	Qty	(or Non-conformance	Ch	ief Eng	Desc	ription		Date	Verification	1	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved															
			.				AUI	T CATE	GORY						
Landi	ng (1				General		۱		S	۔ ٦		Г	_	1
	-	Bending Centre Not Concentric to O/S Cracks Crushed/Crimped Cuffs Heat Treat				Bend BOM/Route Broken/Damaged Burrs Contamination Countersink		Grain Hardware Inspection Incomplete Instructions Incomplete/Unclear Maintenance Mislabeled			P P	valized ver/Under art Incorrec art Lost/Mi art Moved ositioned W	ssing		Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled
	L	Inspection Strip in Tube				Cut Too Short		Misread				ower Loss/	Surge	l '	Other

Offset

Out of Calibration

Out of Sequence
Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DART AEROSPACE LTD **SCALE** DRAWING NO. TITLE REV. E D.E.O. NO. SHEET NO. **ENGINEERING ORDER CROSSTUBE ASS'Y (412 HI AFT)** D412-664-243-E-2 SHEET 1 OF 1 D412-664-243 NTS MFG. APPR. DE APPR. DRAWN CHECKED **APPROVED** 11.09.19 11.09.19 DATE 11.09.07 DATE DATE 11.09.19 DATE 11.09.19 DATE

PURPOSE:

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

CHANGE:

IS:

item	Qty -243	Part Number	Description	÷
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD	

WAS:

Г				
Γ	9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023
1				ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,
				TYPE II, CLASS 2 ADHESIVE)

81158

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

WAS

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.



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		DQA:	Date:	
ICD: Voc / No	WORK ORDER NON-CONFORMANCE / HPDATE			

		Α				of which is					QA Closed:	Dat	e:	3	
Work Order:	ork Order:					DISPOSITION			AGAIN	IST DE	EPARTMENT/PROCESS				
Part No. NCR No.		* 1			Rework Sprap Use-as-is Order Update	Machining Thermoforming Large Fab		Small F Finish	ab ing	Prod. Eng. C Rec/Store/Packa		ng Other			
Root				Desc	Description of work order update			Initial Action Chief Eng Description			Sign &		The same of		
Cause	Date	Step	Qty	or Non-conformance			Chief Eng	nief Eng Description			Date	Verification	Q € In	QC Inspector	
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved							22.74								
FAULT CATEGORY															
Landing	Gear	200			Gen	eral		·			,				
	Bending Centre Not Concentric to O/S Cracks Crushed/Crimped Cuffs Heat Treat Inspection Strip in Tube Ripples in Bend Torque Waves in Extrusion Turning Sequence				Bend BOM/Route Broken/Damaged Burrs Contamination Countersink Cut Too Short Drill Holes Drawing Finish		Inspect Instruct Mainte Mislabe Misrea Offset Out of	Hardware Inspection Incomplete Instructions Incomplete/Unclear Maintenance Mislabeled Misread			Ovalized Over/Under Part Incorre Part Lost/M Part Moved Positioned N Power Loss/	ct issing Wrong	Temperat Weld	Wrong Stock Pulled	
	Wave/T.w	rist in Tub	oe .		Folio		Outside	Outside Dimensions							

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